



**International
Standard**

ISO 7944

**Optics and photonics — Reference
wavelengths**

Optique et photonique — Longueurs d'onde de référence

**Third edition
2024-11**

iTeh Standards
(<https://standards.iteh.ai>)
Document Preview

[ISO 7944:2024](https://standards.iteh.ai/catalog/standards/iso/dadf17af-eed7-485f-aba4-a9651a170da1/iso-7944-2024)

<https://standards.iteh.ai/catalog/standards/iso/dadf17af-eed7-485f-aba4-a9651a170da1/iso-7944-2024>

iTeh Standards
(<https://standards.iteh.ai>)
Document Preview

[ISO 7944:2024](https://standards.iteh.ai/catalog/standards/iso/dadf17af-eed7-485f-aba4-a9651a170da1/iso-7944-2024)

<https://standards.iteh.ai/catalog/standards/iso/dadf17af-eed7-485f-aba4-a9651a170da1/iso-7944-2024>



COPYRIGHT PROTECTED DOCUMENT

© ISO 2024

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

Foreword	iv
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Reference wavelengths, principal dispersions and Abbe numbers	1
4.1 General.....	1
4.2 Mercury e-line 546,075 nm.....	1
4.3 Helium d-line 587,562 nm.....	2
4.4 Wavelength tables.....	2
Bibliography	4

iTeh Standards
(<https://standards.iteh.ai>)
Document Preview

[ISO 7944:2024](https://standards.iteh.ai/catalog/standards/iso/dadf17af-eed7-485f-aba4-a9651a170da1/iso-7944-2024)

<https://standards.iteh.ai/catalog/standards/iso/dadf17af-eed7-485f-aba4-a9651a170da1/iso-7944-2024>

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents. ISO shall not be held responsible for identifying any or all such patent rights.

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 172, *Optics and photonics*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 170, *Ophthalmic optics*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This third edition cancels and replaces the second edition (ISO 7944:1998). It also incorporates the Technical Corrigendum ISO 7944:1998/Cor 1:2009, which has been technically revised.

The main changes are as follows:

- updated to the current format and drafting rules;
- clarification through rewording in [4.1](#) and deletion of Note;
- addition of wavelengths to [Tables 1](#), [2](#) and [3](#), alignment of precision of the stated wavelengths with the sources and explanation of the source.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Optics and photonics — Reference wavelengths

1 Scope

This document specifies reference wavelengths to be used for the characterization of optical materials, optical systems and instruments, and ophthalmic lenses. It defines the associated principal refractive indices and principal dispersions, as well as the Abbe numbers with regard to these reference wavelengths and principal dispersions.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

4 Reference wavelengths, principal dispersions and Abbe numbers¹⁾

4.1 General

For ophthalmic lenses and many non-ophthalmic optical applications, the reference wavelengths are the mercury e-line 546,07 nm (see [4.2](#)) and the helium d-line 587,56 nm (see [4.3](#)).

For other non-ophthalmic optical applications, the appropriate reference wavelength shall be specified. Any reference wavelength is allowed (see [Tables 1, 2, 3](#) as well as other wavelengths).

If nothing is specified, the mercury e-line shall be the reference wavelength.

4.2 Mercury e-line 546,075 nm

The associated principal refractive index n_e is the refractive index at the green mercury e-line and the associated principal dispersion is given by [Formula \(1\)](#):

$$n_{F'} - n_{C'} \tag{1}$$

where

$n_{F'}$ is the refractive index at the blue cadmium F'-line;

$n_{C'}$ is the refractive index at the red cadmium C'-line.

1) ISO 9802 gives the terms and definitions for principal dispersion and Abbe number.

The Abbe number v_e with regard to this reference wavelength and this principal dispersion is defined as given by [Formula \(2\)](#):

$$v_e = \frac{n_e - 1}{n_{F'} - n_{C'}} \quad (2)$$

4.3 Helium d-line 587,562 nm

The associated principal refractive index n_d is the refractive index at the yellow helium d-line and the associated principal dispersion is given by [Formula \(3\)](#):

$$n_F - n_C \quad (3)$$

where

n_F is the refractive index at the blue hydrogen F-line;

n_C is the refractive index at the red hydrogen C-line.

The Abbe number v_d with regard to this reference wavelength and this principal dispersion is defined as given in [Formula \(4\)](#):

$$v_d = \frac{n_d - 1}{n_F - n_C} \quad (4)$$

4.4 Wavelength tables

Table 1 — Reference wavelengths and recommended wavelengths in the visible and ultraviolet spectral ranges

Spectrum reference	Spectral line	Element	Wavelength nm
—	—	Hg	334,148
Ultraviolet mercury	i	Hg	365,016 ^a
Violet mercury	h	Hg	404,657
Blue mercury	g	Hg	435,834
Blue cadmium	F'	Cd	479,991
Blue hydrogen	F	H	486,135
Green mercury	e	Hg	546,075
Yellow helium	d	He	587,562
Red cadmium	C'	Cd	643,847
Red hydrogen	C	H	656,279
Red helium	r	He	706,519

^a This single line of the Hg-triplet should be used.
 NOTE Data for standard air – see References [2][3]. For spectroscopic purposes, 'Standard Air' is defined as; 101,325 kPa, 15 °C, 0,033 % of CO₂, and no H₂O.